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Janus Colloids Assemble into Cluster Shapes LIANG HONG, ANGELO CACCIUTO, ERIK LUIJTEN, STEVE GRANICK, University of Illinois at Urbana-Champaign — We explore the assembly of two types of micron-sized, spherical Janus particles: those with opposite electric charge on both hemispheres ("bipolar") and those hydrophobic on one hemisphere and hydrophilic on the other ("amphiphilic"). Bipolar particles form clusters, not strings, as the particle diameter exceeds the electrostatic screening length. The cluster shapes are analyzed by combined epifluorescence microscopy and Monte Carlo computer simulations with excellent agreement, indicating that the particles assemble in aqueous suspension to form equilibrated aggregates. The simulations show that charge asymmetry of individual bipolar particles is preserved in the clusters. The assembly of amphiphilic particles presents analogies to the self-assembly of molecular surfactants, forming monolayers at the air-water interface and micelles in the aqueous suspension. By tuning the salt concentration, different phases of micelle can be imaged in real space. Computer simulations confirm the geometries of these micelles and reveal possible formation mechanisms.

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